Air Quality Monitoring

The Neighbourhood of Calder, City of Edmonton

Alberta Environment

February 11, 13 and 24, 2004 — Interim Report

Summary

Alberta Environment conducts mobile air quality surveys each year as part of its air quality monitoring program in Alberta. These monitoring surveys are unannounced and use the Department's *Mobile Air Monitoring Laboratory* (MAML). The MAML monitoring provides a "snapshot" in time and space of the air quality at the location monitored. Pollutants measured by the MAML included carbon monoxide, oxides of nitrogen, ozone, particulate matter, hydrocarbons, sulphur dioxide, hydrogen sulphide, total reduced sulphur and ammonia.

Alberta Environment is currently conducting a mobile ambient air quality monitoring survey in the neighbourhood of Calder in the City of Edmonton. The study is ongoing and will consist of six surveys, over two seasons. The results reported here are from the winter survey.

The objectives of monitoring this area are to determine concentrations of air pollutants representative of the monitored locations near facilities and residences in the survey area, to help address resident's concerns about emissions from the trains at the CN Calder Yards, and to provide data to support air quality monitoring and modelling activities that have been conducted in the area.

During the winter survey, the MAML monitored air quality for three days at eight sites in the Calder neighbourhood. The winter survey consists of 24 hours of air quality monitoring information. Each site was monitored for at least one hour to allow comparison with Alberta's one-hour ambient air quality objectives. Monitoring sites were selected to provide data near populated areas and near the CN Calder Yards area. Data from the same time period from three permanent monitoring stations in the City of Edmonton are also presented in this report. This interim report presents the results of the Winter 2004 survey only (February 11, 13, and 24, 2004). A final report will be issued after all monitoring is complete.

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Preliminary Findings

1) **Concentrations of the air pollutants monitored during the Calder Area Winter Survey were below Alberta's Ambient Air Quality Objectives[1].** Alberta has one-hour air quality objectives for carbon monoxide, nitrogen dioxide, ozone, sulphur dioxide, hydrogen sulphide and ammonia. Maximum one-hour concentrations for these pollutants were:
    - 1% of the one-hour guideline for ammonia (NH_3).
    - 9% of the one-hour guideline for carbon monoxide (CO).
    - 20% of the one-hour guideline for hydrogen sulphide (H_2S).
    - 22% of the one-hour guideline for nitrogen dioxide (NO_2).
    - 28% of the one-hour guideline for ozone (O_3).
    - <1% of the one-hour guideline for sulphur dioxide (SO_2).

    Table 1 summarizes the monitoring results and relates results to applicable guidelines.

Table 1: Summary of Monitoring Results and One-Hour Ambient Objectives for the Calder Area Winter Survey.

Pollutant		Units	Measured Levels		Median	Alberta Ambient One Hour Objective	# Objective Exceedances
			Minimum	Maximum			
Ammonia (NH_3)		ppm	bd	0.017	0.007	2	0
Carbon Monoxide (CO)		ppm	bd	1.2	0.7	13	0
Hydrocarbons	Methane (CH_4)	ppm	2.0	3.1	2.4	no guideline	n/a
	Reactive Hydrocarbons (RHC)	ppm	bd	0.6	0.3	n/a	n/a
	Total Hydrocarbons (THC)	ppm	2.1	3.5	2.5	n/a	n/a
Hydrogen Sulphide (H_2S)		ppm	bd	0.002	0.001	0.010	0
Oxides of Nitrogen	Nitric Oxide (NO)	ppm	0.010	0.124	0.040	n/a	n/a
	Nitrogen Dioxide (NO_2)	ppm	0.020	0.046	0.033	0.212	0
	Total Oxides of Nitrogen (NO_x)	ppm	0.030	0.153	0.073	n/a	n/a
Ozone (O_3)		ppm	bd	0.023	0.012	0.082	0
Particulate Matter*	PM_{10}	$\mu g/m^3$	n/a	n/a	n/a	n/a	n/a
	$PM_{2.5}$	$\mu g/m^3$	n/a	n/a	n/a	n/a	n/a
	TSP	$\mu g/m^3$	n/a	n/a	n/a	n/a	n/a
Polycyclic Aromatic Hydrocarbons		ng/m^3	3	55	15	n/a	n/a
Sulphur Dioxide (SO_2)		ppm	bd	bd	bd	0.172	0
Total Reduced Sulphur (TRS)		ppm	bd	0.003	0.001	n/a	n/a

$\mu g/m^3$-micrograms per cubic metre of air ppm-parts per million n/a-not available

*no data available for this survey bd - below detection limit ng/m^3-nanograms per cubic metre of air

[1] *Alberta Ambient Air Quality Objectives.* Alberta Environment. February 2000.

2) Similar levels of CO, O_3, THC, NO, NO_2, NO_x, and H_2S were observed at the permanent Edmonton monitoring stations compared to the levels observed by the MAML in the Calder area.

3) Due to instrumentation problems, particulate monitoring data was deemed unusable during this survey. This is unfortunate, as obtaining valid monitoring results of particulate concentrations would be helpful in establishing findings about air quality. The MAML operator observed hazy conditions on February 24 and all continuous monitoring stations in Edmonton recorded an Air Quality Index (AQI) of Fair air quality that day. The episode occurred during stable weather conditions (strong temperature inversion and light winds). Air pollutants produced by sources such as automobiles, wood burning and industry were trapped in a very stable layer of air near the ground leading to elevated $PM_{2.5}$ levels. However, the MAML recorded much lower concentrations than the continuous monitoring stations, and the results are therefore not considered to be usable. Additional steps will be taken during the next scheduled MAML monitoring survey in the area to validate MAML monitoring results with continuous monitoring stations. The next survey will include monitoring by the MAML next to a permanent air quality monitoring station for data comparison.

   Good air quality occurs in Alberta over 90% of the time. The index will occasionally reach into the Fair range (less than 10% of the time) and is typical when weather conditions inhibit pollutant dispersion.

Alberta's Ambient Air Quality Objectives (AAAQ Objectives)

Alberta's Ambient Air Quality Objectives are established under Section 14 of the Environmental Protection and Enhancement Act (EPEA). EPEA provides for the development of objectives and ambient environmental quality objectives for Alberta.

The Ambient Air Quality Objectives are used for:

- reporting on the state of the atmospheric environment in Alberta.
- reporting to Albertans on the quality of air through an air quality index (AQI).
- establishing approval conditions for regulated industrial facilities.
- evaluating proposals to construct facilities that will have air emissions.
- guiding special ambient air quality surveys.
- assessing compliance near major industrial air emission sources.

Some of Alberta's Ambient Air Quality Objectives are based on odour perception. This is the case for hydrogen sulphide, ammonia and nitrogen dioxide. For these chemicals, people are likely to detect an odour at concentrations well below levels that may affect human health.

Alberta's Ambient Air Quality Objectives for one-hour concentrations of parameters monitored by the MAML and the basis for the guideline are listed in Table 2.

Table 2: Alberta's Ambient Air Quality Objectives for Parameters Monitored by the MAML.

AIR QUALITY PARAMETER	ONE-HOUR OBJECTIVE (PPM*)	BASIS FOR OBJECTIVE
Ammonia	2	odour perception
Carbon monoxide	13	oxygen carrying capacity of blood
Hydrogen sulphide	0.010	odour perception
Nitrogen dioxide	0.212	odour perception
Ozone	0.082	reduction of lung function and vegetation
Sulphur dioxide	0.172	pulmonary function

*Parts per million by volume.

Monitoring Using the Mobile Air Monitoring Laboratory

The Mobile Air Monitoring Laboratory

The MAML is a 27-foot (8.2 m) vehicle specially designed and equipped to measure air quality (Figure 1). The MAML monitoring provides a "snapshot" in time and space of the air quality at the location monitored. It houses a variety of instruments that continuously sample air at specified times or distance intervals. The MAML is equipped with:

- a dual computer system custom-programmed to accept and record the measurement of air samples from each analyzer.
- a GPS (Global Positioning System) that identifies the MAML's location as it moves around Alberta.
- an exhaust purifying system that minimizes emissions from the vehicle.
- two on-board generators that are also equipped with exhaust scrubbers.

Monitoring Locations

Figure 1: Alberta Environment's Mobile Air Monitoring Laboratory (*MAML*).

The monitored sites used were within the City of Edmonton at the locations provided in Table 3 and Figure 2. Figure 3 shows monitoring site 6.

Figure 2: MAML Monitoring Locations (City of Edmonton).

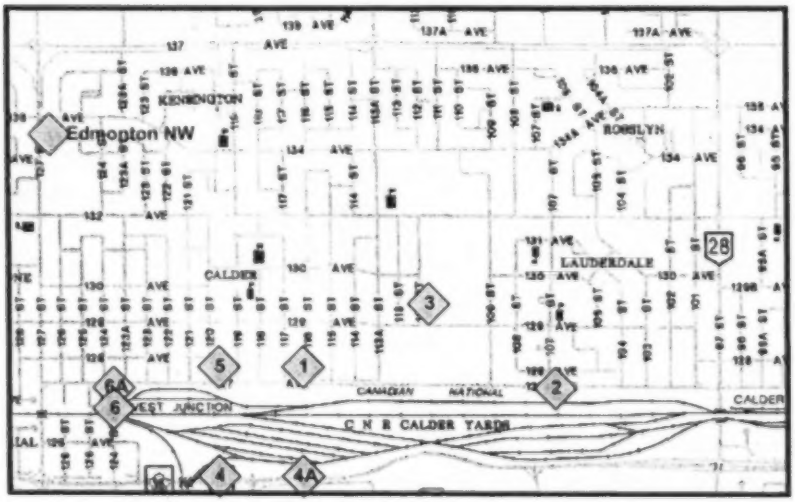

Figure 3: Site 6

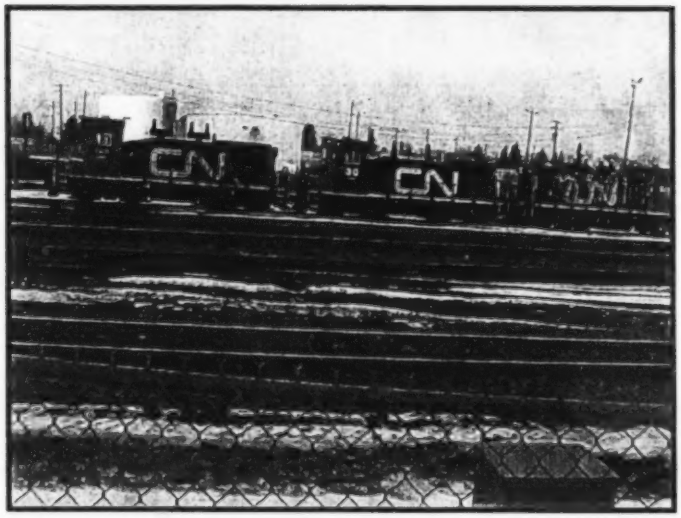

Table 3: Monitoring Locations and Associated Site Numbers

Site #	Monitoring Location	Dates Monitored
		Winter Feb-04
1	117 St & 127 Ave	11
2	107 St & 127 Ave	11, 13, 24
3	Grand Trunk Leisure Center 112 St & 130 Ave.	11, 24
4	West end of CN Parking Lot North Side of Yellowhead Trail accessed at 119 St.	11, 13
4a	East end of CN Parking Lot North Side of Yellowhead Trail accessed at 119 St.	13
5	Clader Community Hall 120 St & 128 Ave.	11, 24
6	124 St. & 1/2 block North of 126 St.	13, 24
6a	Between 124 & 125 St 1/2 block south of 127 Ave.	24
Edmonton Central	10255-104 Street (Permanent Monitoring Station)	Continuous
Edmonton Northwest	13335-127 Street (Permanent Monitoring Station)	Continuous
Edmonton East	17 Street and 105 Avenue (Permanent Monitoring Station)	Continuous

Table 4 summarizes parameters monitored in this survey, Table 5, one-hour average values, Tables 6 and 7 average and maximum ambient air concentrations monitored by the MAML and Edmonton stations on the days of the survey, and Table 8 includes the weather conditions and operator observations made during the survey.

Table 4: Parameters monitored for the Calder Area Survey and instrument operating range.

Parameter Measured		Operating Range	
		Lower Detection Limit*	Maximum Detection Limit**
Ammonia (NH_3)		0.001 ppm	5 ppm
Carbon Monoxide (CO)		0.1 ppm	50 ppm
Hydrocarbons	Methane (CH_4)	0.005 ppm	10 ppm
	Reactive Hydrocarbons (RHC)	0.005 ppm	20 ppm
	Total Hydrocarbons (THC)	0.005 ppm	20 ppm
Hydrogen Sulphide (H_2S)		0.0006 ppm	1 ppm
Oxides of Nitrogen	Nitric Oxide (NO)	0.001 ppm	1 ppm
	Nitrogen Dioxide (NO_2)	0.001 ppm	1 ppm
	Total Oxides of Nitrogen (NO_x)	0.001 ppm	1 ppm
Ozone (O_3)		0.001 ppm	0.5 ppm
Particulates	Inhalable Particulates (PM_{10})	1 $\mu g/m^3$	1.0 g/m^3
	Respirable Particulates ($PM_{2.5}$)	1 $\mu g/m^3$	1.0 g/m^3
	Total Suspended Particulates (TSP)	1 $\mu g/m^3$	1.0 g/m^3
Polycyclic Aromatic Hydrocarbons (PAHs)		3 ng/m^3	1000 ng/m^3
Sulphur Dioxide (SO_2)		0.0006 ppm	1 ppm
Total Reduced Sulphur (TRS)		0.0006 ppm	1 ppm
Relative Humidity (RH)		0 %	100 %
Temperature (Temp)		-40 °C	50 °C
Wind Direction (WDR)		0 degrees	360 degrees
Wind Speed (WSP)		0 km/h	200 km/h

ppb = parts per billion
ppm = parts per million
ng/m^3 = nanograms per cubic metre
$\mu g/m^3$ = micrograms per cubic metre
g/m^3 = grams per cubic metre
km/h = kilometres per hour
°C = degrees Celsius
% = per cent

* The *lower **detection limit*** indicates the *minimum* amount of pollutant the instrument can measure.

** The ***maximum detection limit*** indicates the *maximum* amount of pollutant the instrument can detect. This limit is set to provide the optimum precision over that range. The upper limit can be raised, however, precision at the lower levels (where most levels are monitored) is then compromised.

Table 5: One-hour average ambient air concentrations at each MAML monitoring site during the Calder Area Winter Survey, February 2004

Date	Monitoring Location	Time (MST)	CO (ppm)	O_3 (ppm)	THC (ppm)	CH_4 (ppm)	RHC (ppm)	SO_2 (ppm)	NO (ppm)	NO_2 (ppm)	NO_x (ppm)	NH_3 (ppm)	TRS (ppm)	H_2S (ppm)	TSP ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	PAH ng/m^3
11-Feb-04	1	08:23 to 09:23	1.2	0.005	2.7	2.3	0.4	bd	0.109	0.034	0.140	0.007	0.002	0.001	n/a	n/a	n/a	38.2
	1	15:24 to 16:23	0.7	0.018	2.5	2.4	0.1	0.002	0.022	0.029	0.050	0.005	bd	bd	n/a	n/a	n/a	19.6
	2	09:27 to 10:30	0.8	0.008	2.4	2.2	0.4	bd	0.074	0.034	0.106	0.004	0.001	bd	n/a	n/a	n/a	33.2
	2	17:42 to 18:41	1.1	0.001	2.6	2.5	0.2	0.002	0.057	0.042	0.098	0.007	bd	bd	n/a	n/a	n/a	33.4
	3	10:35 to 11:48	0.7	0.013	2.4	2.2	0.4	bd	0.054	0.031	0.082	0.004	0.001	bd	n/a	n/a	n/a	16.5
	3	14:18 to 15:19	0.5	0.021	2.5	2.4	0.2	0.001	0.021	0.025	0.044	0.006	bd	bd	n/a	n/a	n/a	9.8
	4	11:58 to 12:58	1.0	0.012	2.4	2.1	0.6	0.002	0.124	0.035	0.153	0.017	0.001	bd	n/a	n/a	n/a	55.4
	5	13:08 to 14:12	0.7	0.019	2.1	2.0	0.6	0.001	0.046	0.026	0.070	0.009	bd	bd	n/a	n/a	n/a	14.2
	5	16:38 to 17:37	0.9	0.005	2.6	2.5	0.2	0.002	0.072	0.039	0.110	0.007	bd	0.001	n/a	n/a	n/a	30.3
13-Feb-04	2	07:43 to 08:44	0.5	0.015	2.3	2.0	0.3	bd	0.014	0.022	0.035	0.006	0.002	0.002	n/a	n/a	n/a	13.1
	4	08:50 to 09:50	0.2	0.018	2.2	2.0	0.2	bd	0.037	0.021	0.056	0.006	0.003	0.001	n/a	n/a	n/a	9.2
	4a	09:53 to 10:53	0.2	0.023	2.2	2.0	0.2	bd	0.014	0.021	0.035	0.006	0.002	bd	n/a	n/a	n/a	7.6
	6	11:09 to 12:09	bd	0.020	2.2	2.1	0.1	bd	0.029	0.023	0.051	0.006	0.001	0.001	n/a	n/a	n/a	4.2
	6	14:20 to 15:20	0.1	0.019	2.2	2.2	0.0	bd	0.033	0.023	0.054	0.010	0.001	0.001	n/a	n/a	n/a	6.0
	6a	12:13 to 13:13	0.2	0.021	2.2	2.1	0.1	bd	0.025	0.018	0.043	0.007	0.001	0.001	n/a	n/a	n/a	3.2
	6a	13:13 to 14:13	0.1	0.022	2.2	2.1	0.1	bd	0.017	0.015	0.032	0.006	0.001	0.001	n/a	n/a	n/a	3.1
2/24/2004*	3	16:46 to 17:47	0.5	0.004	3.2	2.8	0.4	0.003	0.033	0.042	0.075	0.008	0.001	0.001	n/a	n/a	n/a	6.8
	5	14:23 to 15:23	0.6	0.012	3.2	2.8	0.5	0.004	0.024	0.029	0.055	0.008	0.003	0.002	n/a	n/a	n/a	4.8
	6	15:31 to 16:32	0.4	0.008	3.1	2.7	0.4	0.004	0.042	0.046	0.088	0.008	0.002	0.001	n/a	n/a	n/a	15.7
	6	20:06 to 21:06	0.7	0.001	3.1	2.9	0.3	0.001	0.045	0.037	0.080	0.013	0.001	0.001	n/a	n/a	n/a	13.0
	6	21:06 to 22:06	1.0	0.001	3.1	2.9	0.3	0.002	0.047	0.041	0.085	0.010	0.001	bd	n/a	n/a	n/a	19.6
	6	22:07 to 22:35	1.0	0.001	3.0	2.9	0.2	0.001	0.044	0.038	0.080	0.010	0.001	bd	n/a	n/a	n/a	21.3
	6a	17:52 to 18:52	0.8	0.001	3.5	3.1	0.5	0.001	0.053	0.046	0.097	0.009	0.002	0.001	n/a	n/a	n/a	20.3
	6a	18:52 to 19:51	0.9	0.001	3.2	3.0	0.3	0.001	0.033	0.040	0.070	0.010	0.001	0.001	n/a	n/a	n/a	38.6

bd = below minimum detectable limit n/a = not available

*sites 4 and 4a were not monitored on February 24 as access was blocked due to CN workers strike

Table 6: Average Ambient Air Concentrations Recorded by the MAML and at Edmonton Stations During the Calder Area Winter Survey

Date	Station	CO (ppm)	O_3 (ppm)	THC (ppm)	CH_4 (ppm)	RHC (ppm)	SO_2 (ppm)	NO (ppm)	NO_2 (ppm)	NO_x (ppm)	NH_3 (ppm)	TRS (ppm)	H_2S (ppm)	TSP ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	PAH ng/m^3
11-Feb-04	MAML[a]	0.8	0.011	2.5	2.3	0.3	0.001	0.064	0.033	0.095	0.007	0.001	bd	n/a	n/a	n/a	27.8
	Edmonton East[b]	0.4	0.017	2.3	-	-	0.001	0.019	0.028	0.047	-	-	0.001	-	-	3	-
	Edmonton Central[b]	0.7	0.006	2.3	-	-	-	0.025	0.038	0.063	-	-	-	-	-	6	-
	Edmonton Northwest[b]	0.8	0.007	2.2	-	-	-	0.052	0.039	0.091	-	-	-	-	22	5	-
13-Feb-04	MAML[c]	0.2	0.020	2.2	2.1	0.1	bd	0.024	0.020	0.044	0.007	0.002	0.001	n/a	n/a	n/a	6.6
	Edmonton East[b]	0.2	0.024	3.3	-	-	0.001	0.010	0.018	0.027	-	-	0.001	-	-	2	-
	Edmonton Central[b]	0.5	0.011	2.1	-	-	-	0.025	0.029	0.054	-	-	-	-	-	3	-
	Edmonton Northwest[b]	0.3	0.026	1.9	-	-	-	0.005	0.013	0.018	-	-	-	-	7	2	-
24-Feb-04	MAML[d]	0.7	0.004	3.2	2.9	0.4	0.002	0.040	0.040	0.079	0.010	0.002	0.001	n/a	n/a	n/a	17.5
	Edmonton East[b]	0.9	0.004	3.7	-	-	0.002	0.086	0.050	0.136	-	-	0.002	-	-	29	-
	Edmonton Central[b]	1.4	0.001	3.2	-	-	-	0.112	0.052	0.164	-	-	-	-	-	36	-
	Edmonton Northwest[b]	1.2	0.003	2.9	-	-	-	0.102	0.048	0.151	-	-	-	-	66	34	-
Alberta one-hour ambient air quality objective		**13**	**0.082**	**n/a**	**n/a**	**n/a**	**0.172**	**n/a**	**0.212**	**n/a**	**2**	**n/a**	**0.010**	**n/a**	**n/a**	**n/a**	**n/a**

a average taken over 9 hours of monitoring
b average taken over 24 hours of monitoring
c average taken over 7 hours of monitoring
d average taken over 8 hours of monitoring
bd below detection limit
n/a not available
- parameter not monitored at this station

Table 7: Maximum Ambient Air Concentrations Recorded by the MAML and at Edmonton Stations During the Calder Area Winter Survey

Date	Station	CO (ppm)	O_3 (ppm)	THC (ppm)	CH_4 (ppm)	RHC (ppm)	SO_2 (ppm)	NO (ppm)	NO_2 (ppm)	NO_x (ppm)	NH_3 (ppm)	TRS (ppm)	H_2S (ppm)	TSP ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	PAH ng/m^3
11-Feb-04	MAML[a]	1.2	0.021	2.7	2.5	0.6	0.002	0.124	0.042	0.153	0.017	0.002	0.001	n/a	n/a	n/a	55.4
	Edmonton East[b]	0.7	0.028	2.7	-	-	0.002	0.036	0.044	0.076	-	-	0.001	-	-	5	-
	Edmonton Central[b]	1.5	0.014	2.5	-	-	-	0.047	0.047	0.085	-	-	-	-	-	14	-
	Edmonton Northwest[b]	1.6	0.024	2.7	-	-	-	0.138	0.054	0.192	-	-	-	-	48	10	-
13-Feb-04	MAML[c]	0.5	0.023	2.3	2.2	0.3	bd	0.037	0.023	0.056	0.010	0.003	0.002	n/a	n/a	n/a	13.1
	Edmonton East[b]	0.4	0.034	5.9	-	-	0.003	0.052	0.046	0.098	-	-	0.006	-	-	9	-
	Edmonton Central[b]	0.9	0.017	2.3	-	-	-	0.051	0.040	0.082	-	-	-	-	-	9	-
	Edmonton Northwest[b]	1.0	0.033	2.0	-	-	-	0.040	0.036	0.076	-	-	-	-	12	4	-
24-Feb-04	MAML[d]	1.0	0.012	3.5	3.1	0.5	0.004	0.053	0.046	0.097	0.013	0.003	0.002	n/a	n/a	n/a	38.6
	Edmonton East[b]	1.5	0.008	4.6	-	-	-	0.178	0.075	0.234	-	-	0.004	-	-	67	-
	Edmonton Central[b]	2.6	0.003	3.6	-	-	-	0.236	0.070	0.289	-	-	-	-	-	74	-
	Edmonton Northwest[b]	2.7	0.012	3.8	-	-	-	0.280	0.071	0.348	-	-	-	-	167	71	-
Alberta one-hour ambient air quality objective		**13**	**0.082**	**n/a**	**n/a**	**n/a**	**0.172**	**n/a**	**0.212**	**n/a**	**2**	**n/a**	**0.010**	**n/a**	**n/a**	**n/a**	**n/a**

a maximum value taken over 9 hours of monitoring
b maximum value taken over 24 hours of monitoring
c maximum value taken over 7 hours of monitoring
d maximum value taken over 8 hours of monitoring
n/a not available
- parameter not monitored at this station

Table 8: Weather Conditions and Operator's Remarks During Monitoring in the Calder Area

Date	Monitoring Location	Time (MST)	Temp.	Relative Humidity	Wind Speed	Wind Dir.	Operator's Remarks
			°C	%	km/h		
11-Feb-04	1	08:23 to 09:23	-15.0	78.6	8.1	SW	continuous traffic on 127 ave intermittent traffic on 117 st
	2	09:27 to 10:30	-12.6	72.6	9.0	SW	
	3	10:35 to 11:48	-9.0	60.5	6.6	S	
	4	11:58 to 12:58	-5.8	55.0	11.2	S	
	5	13:08 to 14:12	-3.3	51.7	10.7	S	no exceptional activity in Calder Yards
	3	14:18 to 15:19	-2.2	53.2	10.7	S	
	1	15:24 to 16:23	-1.4	54.6	11.1	SW	
	2	17:42 to 18:41	-3.3	67.4	5.5	SW	
	5	16:38 to 17:37	-3.1	64.0	5.5	SW	
13-Feb-04	2	07:43 to 08:44	-4.7	91.3	6.5	E	good visibility
	4	08:50 to 09:50	-4.1	88.8	8.4	E	Normal traffic on Yellowhead
	4A	09:53 to 10:53	-3.3	84.4	10.0	NE	
	6	11:09 to 12:09	-3.4	83.8	12.0	E	Engine shuttling back and forth at times
	6A	12:13 to 13:13	-3.6	80.3	9.6	E	along fenceline at edge of yard
	6A	13:13 to 14:13	-3.7	76.3	8.1	E	Diesel shop immediately east of site
	6	14:20 to 15:20	-4.4	75.7	14.2	E	wind picks up
24-Feb-04	5	14:23 to 15:23	0.1	70.0	5.8	E	Hazy conditions city wide AQI is 40
	6	15:31 to 16:32	0.7	69.8	7.4	E	Some yard activity, still generally hazy
	3	16:46 to 17:47	-1.3	76.6	8.5	E	Upwind site
	6A	17:52 to 18:52	-3.2	85.2	3.9	E	Hazy all over, not just Calder vicinity
	6A	18:52 to 19:51	-4.2	87.8	2.7	E	Wind coming right from diesel shops
	6	20:06 to 21:06	-4.7	88.6	4.3	NE	Occasional train traffic
	6	21:06 to 22:06	-5.3	91.6	4.9	E	Occasional train traffic
	6	22:07 to 22:35	-6.0	92.9	4.3	E	1/2 hr average

*Weather conditions based on observations at monitoring site. Units are: temperature [°C], relative humidity [%], wind speed [km/h], wind direction [degrees] and cloud cover